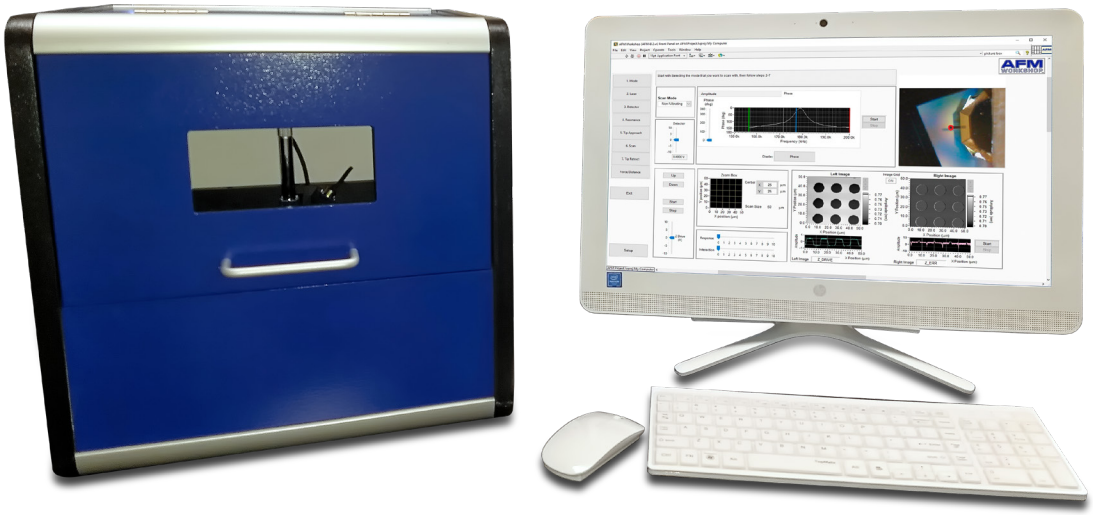
B-AFM



The **B-AFM** is a basic AFM that provides routine scanning. Ideal for scientists and educators, the **B-AFM** is capable of creating high-resolution topography images of nanostructures in standard scanning modes. A low price point makes the B-AFM the only option for scientists with **bigger ideas than budgets**.

The complete **B-AFM** system includes the AFM stage, electronics, enclosure, computer and software. Only a single USB cable connected from the AFM to the stage is needed to start scanning high-quality AFM images.

7-Step Scanning Software

The B-AFM 7-Step Scanning Software is designed for casual AFM users that want to obtain AFM images without the expertise. A user-friendly design makes the B-AFM ideal for teaching students the basics of AFM theory and operation.

Intuitive Light Lever Design

A unique design of the light lever makes aligning the system a routine procedure for users with limited experience. A removable probe holder makes changing probes quick and easy.

Linearized X, Y, and Z Scanners

Piezoelectric X, Y (50 µm) and Z (17 µm) scanners incorporate strain gauges that provide linear scans and rapid zoom-to-feature capabilities.

Standard AFM Scanning Modes

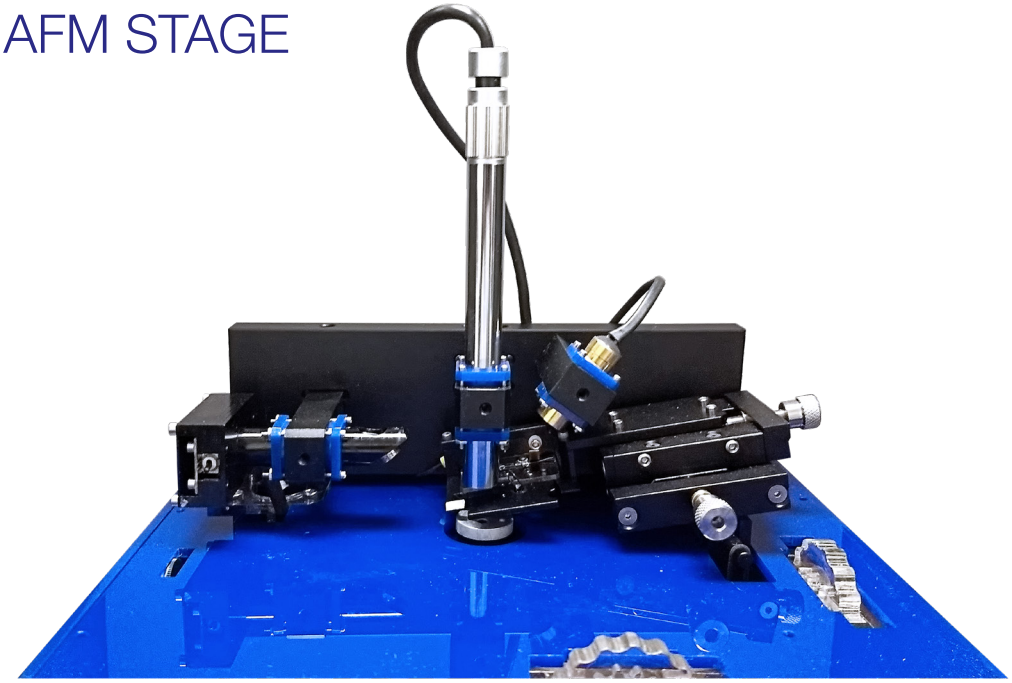
Scanning modes for the B-AFM include vibrating (tapping), non-vibrating (contact), phase, and LFM (Force/Distance). These modes will allow users to scan the most common types of samples.

Acoustic Enclosure

The B-AFM is encased in an acoustic cabinet made from ¾" MDF and acoustic foam, creating a vibration isolation environment that will provide high-quality scans on almost any lab bench

1434 East 33rd St., Signal Hill, CA 90755 | (888) 671-5539 info@afmworkshop.com www.afmworkshop.com

AFM STAGE



The **B-AFM** stage has an open design which makes exchanging samples and probes a straightforward process. Adjustments to the camera, photodetector, probe, and sample are all easily facilitated with the **B-AFM**. Students are able to see all of the components in action, allowing fast and simple operational and theoretical training.

Simplified Key Operational Steps

- **Aligning the Light Lever** - A unique feature of the B-AFM is that the probe is moved to a pre-established position identified with the video microscope. This removes inaccuracy when aligning the light lever over successive scans.
- **Exchanging Samples** - The magnetic sample holder at the top of the piezoelectric stage make sample exchange a routine process. Samples are mounted onto metal disks and easily placed on the magnetic sample holder.
- **Exchanging Probes** - A removable probe holder with a spring-action clamp allows probe exchange to be done easily within one minute. A probe holder support is provided to store the probe holder when it is not in the AFM.

Video Optical Microscope

An LED video optical microscope is used for locating features on samples, aligning the light lever, and facilitating probe approach. With 200X zoom, adjustable focus, and an LED illumination light, this optical microscope is all an AFM user needs to start scanning.

Sample Stage

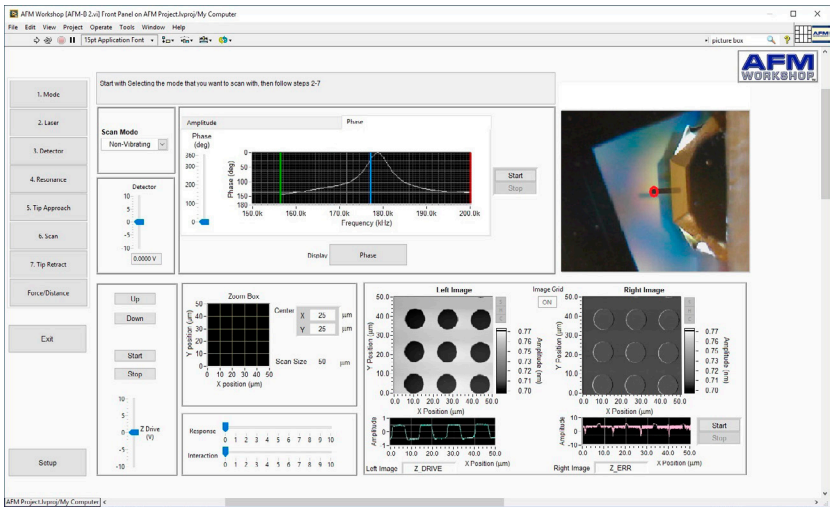
The sample stage has an XY translation range of 6 mm X 6 mm, and is used to select an area of interest on a sample for scanning. The controls for the positioner are conveniently located on the surface of the B-AFM stage, and the magnetic sample holder makes exchanging samples easy and intuitive.

Enclosure

Made with a high-density material and lined on the inside with noise-reducing foam, the front-opening enclosure of the B-AFM reduces both structural and acoustic vibrations that can affect the quality of AFM scans. Handles on the side make it easy to transport, and storage units inside the enclosure save room for probes, samples, tweezers, and other tools.

SOFTWARE

The **B-AFM 7-Step Scanning Software** has an intuitive design intended for routine scanning by users with limited experience operating an AFM, as well as by advanced AFM users. The user-friendly design covers the 7 basic steps necessary to obtain an AFM image, with enough flexibility to scan a wide array of samples.



7-Step Scanning Software

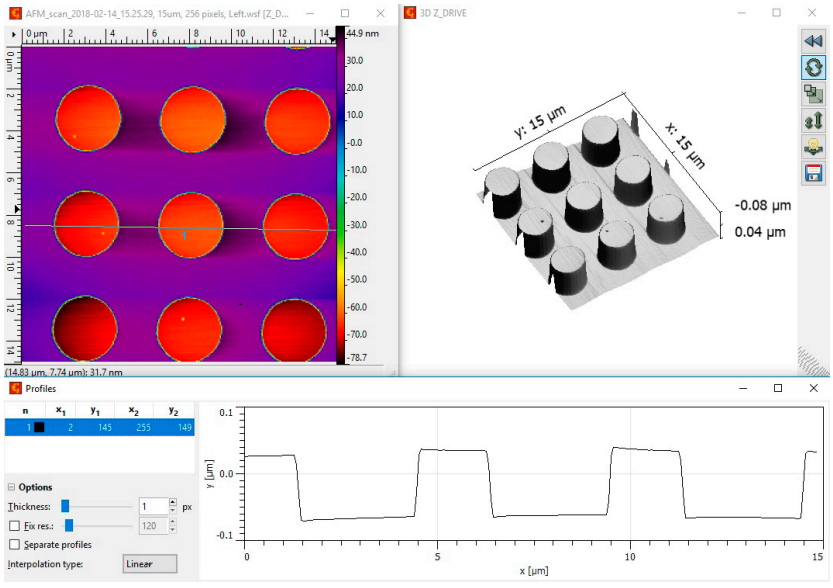
By moving through each of the 7 steps: Mode, Laser, Detector, Resonance, Tip Approach, Scan, Tip Retract; users will develop an intuitive sense of what is required to obtain an AFM image. The step-by-step design is meant to facilitate an easier scanning experience, and provide an opportunity for basic training. For more advanced users, Setup Mode provides additional flexibility.

PROCESSING IMAGES

Images obtained with the **B-AFM** are compatible with the free image processing software **Gwyddion**. Gwyddion is capable of displaying images and data in 2D and 3D formats in a vast range of pallets, and is an essential tool for the visualization of AFM data. Analysis features include line profiles, surface texture, and more.

Gwyddion Software

Gwyddion allows users to analyze AFM topographic data as well as visualize data in 2D and 3D in a wide array of pallets.



B-AFM OPTIONS

The **B-AFM** has several additional options for education and advanced scanning.

Advanced Control Software

The advanced control software is used for controlling the more advanced AFMs from AFM Workshop, and can be purchased as an option to unlock higher scanning capabilities from the **B-AFM**. With this advanced control software, users are able to control:

- **Scan Parameters**: Including scan rate, scan lines.
- **Range of Frequency**: Allows for many types of probes.
- **Amplifier Gain**: Control allows for noise floors less than 120 picometers.

Educational Packages

For instruction on the operation, theory, and application of AFMs in high schools, colleges, and universities, AFM Workshop has partnered with SurfaceChar to offer educational modules for the B-AFM.

- **Basic Imaging**: Covers the basic operating modes of AFM for topographic imaging: vibrating (tapping) and non-vibrating (contact). In this module, students will measure a metal thin film in both modes, and compare scans to understand the different operating principles behind the two modes. Basic image processing and analysis techniques will also be covered as they apply to the data obtained during the module.
- **Chemistry**: AFM is applied to the study of thin polymer films. Phase imaging in vibrating mode will be used to compare various polymer films as well as their structure and morphology to better understand their structure-property relationships.
- **Materials Science**: AFM is applied to the study of thin film surface structures and compositional heterogeneity. Topography scans are used to quantify different surface morphologies; phase scanning is used to explore and analyze the composition of paint.
- **Mechanical Engineering**: AFM is a powerful tool allowing measurements of mechanical properties at the nanoscale. In this module, the force curve mode is used to make stiffness and adhesion measurements on various samples.
- **Nanotechnology**: AFM is one of the primary tools used for quality control in the semiconductor industry as it provides a high-resolution as well as a true topographic map of surfaces with features at the nanoscale. In this module, AFM is used to make metrological measurements on a DVD and Blu-ray disc to compare the two technologies.

These modules can be purchased directly from AFM Workshop or from the SurfaceChar website.

B-AFM CONTROL ELECTRONICS

The control electronics circuits in the **B-AFM** are the same as those used in over **250 AFM Workshop customers** around the globe, ensuring reliability and consistency. The electronics include a high-fidelity analog control loop for measuring topography and 24-bit scan DACs for driving the X and Y piezoelectric ceramics. Our unique design offers high-resolution as well as a high-dynamic range.

SPECIFICATIONS

Acoustic Cabinet:

L x W x H	16" x 16" x 16"
Weight	20 lbs. (9 kg)
Material	MDF, Foam

Light Lever:

Laser	
Power	1 mW
Focus	20 microns
Focal Length	34 mm
Photo Detector	
Quadrants	4
Signals	TL, TR, BL, BR
Probe Holder	
Type	Spring Clamp
Probes	Industry Standard
Probe Approach	
Motor Type	Stepper
Min Step Size	200 nm

XYZ Sample Scanner:

XY Range	50 microns
Z Range	17 microns
Motion Sensor	Strain Gauge
XY Feedback	GPID

Sample Holder:

Type	Magnetic
Sample Thickness	< 4 mm
Sample size	30 mm x 30 mm x 4 mm

Video Microscope:

Focus	Adjustable
Magnification	200 X

Scan Modes:

Vibrating	Soft, Hard Samples
Non-Vibrating	Hard Samples
Phase	Polymers
LFM	

Electronics:

Scan Control	20 Bits
Z Feedback	Analog GPID
PLL	5-600 K